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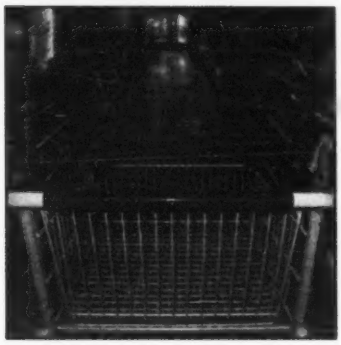
Associations between household food insecurity and health outcomes in the Aboriginal population (excluding reserves)



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Abstract

Background
Aboriginal people are more vulnerable to food insecurity and morbidity than is the Canadian population overall. However, little information is available about the association between food insecurity and health in Aboriginal households.

Data and methods
Data from the 2004 Canadian Community Health Survey—Nutrition were used to examine the relationships between household food security and self-reported health, well-being and health behaviours in a sample of 837 Aboriginal adults living off reserve. Household food security status was based on Health Canada's interpretation of the United States Household Food Security Survey Module. Multivariable logistic regression was used to identify significant relationships, while adjusting for potential confounders.

Results
An estimated 29% of Aboriginal people aged 18 or older lived in food-insecure households. They were more likely to report poor general and mental health, life dissatisfaction, a very weak sense of community belonging, high stress and cigarette smoking, compared with their counterparts in food-secure households. When age, gender and household education were taken into account, respondents from food-insecure households had significantly higher odds of poor general health, high stress, life dissatisfaction, and a very weak community belonging.

Interpretation
Reductions in household food insecurity may improve the health and well-being of Aboriginals living off-reserve.

Keywords
Diet, eating, food intake, health behaviour, low income population, nutrition surveys, poverty

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Food insecurity exists when the availability of nutritionally adequate and safe foods or the ability to acquire such food in socially acceptable ways is limited or uncertain.[1] It can range from the fear of not being able to provide or obtain food to hunger due to food shortages. The deprivation of basic need represented by food insecurity is a possible precursor to suboptimal dietary intakes and compromised health and well-being.[2,3] Food insecurity is thus an important public health issue, particularly for economically marginalized groups including Aboriginal peoples.[4-7]

In Canada, "Aboriginal peoples" are the descendants of the original inhabitants of North America, and include Status and non-Status Indians (First Nations), Métis and Inuit.[8] Research shows that the health of these groups is less favourable than that of the non-Aboriginal population.[9] Moreover, health inequalities persist when socio-economic factors, obesity and health behaviours such as smoking and alcohol consumption are taken into account.[9]

The Canadian Community Health Survey (CCHS) provides information on health status, health care use and health determinants. Although the survey excludes residents of Indian Reserves and some remote regions,[10] the CCHS can be used to examine the health of the majority of Aboriginal people. According to the 2001 Census, more than 70% of the Aboriginal population lived off a reserve, most of them (68%) in urban areas.[11] The 2004 CCHS intentionally oversampled Aboriginal people aged 19 to 50 to allow for analysis of this subpopulation.

The 2004 CCHS was the first cycle of the survey to measure household food security using the United States Household Food Security Survey Module (HFSSM).[12,13] The HFSSM is an internationally validated 18-question measure of the food security status of households in the previous 12 months.[14] Household food insecurity (HFI) identified using the HFSSM is not the same as general income inadequacy; rather, it is a condition of deprivation due

to resource constraint in one specific area of need.[14]

Based on responses to the HFSSM, one-third of Aboriginal households participating in the 2004 CCHS experienced multiple conditions characteristic of HFI; the figure for non-Aboriginal households was 9%.[4] Aboriginal households had a higher prevalence of socio-demographic risk factors for HFI, and the relationship between HFI and these factors was stronger among Aboriginal respondents.[4]

The aim of the present exploratory study was to determine if HFI was a specific correlate of health in the Aboriginal population. Data from the 2004 CCHS were used to examine the relationship between HFI and self-reported health, well-being and health behaviours among adult Aboriginal respondents.

Data and methods

Survey design

The 2004 CCHS—Nutrition was a cross-sectional survey of residents of private dwellings in the 10 provinces. A complex multistage sampling strategy was used to select households and respondents. From January 2004 through January 2005, one member from each of 35,107 households was interviewed. The survey covered approximately 98% of the population of the provinces. To ensure that the survey was representative, a non-response adjustment was applied to the survey weights. Detailed descriptions of the CCHS design, sample and interview procedures are available elsewhere.[12,13,15]

Variable selection

From 13 fixed ethnic responses, respondents were asked to select those that applied. Respondents were included in the present study if they self-identified as Aboriginal, even if they also indicated another ethnic group. This approach is consistent with that used in the Census, whereby someone reporting at least one Aboriginal ancestor is categorized as Aboriginal.[16] Of the 1,528 CCHS respondents who identified as Aboriginal, 59% were North American Indian, 37% Métis and 3% Inuit,[12] a distribution proportionally similar to that in the 2006 Census.[17] Only data from Aboriginal respondents aged 18 or older were used in this analysis.

Because of the relatively small sample size, categories for almost all variables were aggregated. Information about the original survey variables is available elsewhere.[13] Household food security status was based on an interpretation of the responses to the HFSSM developed by Health Canada's Office of Nutrition Policy and Promotion.[13] Specifically, the questions addressed household food access issues in the context of financial constraint. Moderate and severe HFI were combined into a single category.

The socio-demographic variables used in the analyses were age, gender, household education and household income adequacy. Household education was the highest level attained by any household member. Household income adequacy was based on the number of people in the household and total household income from all sources in the 12 months before the interview.

Five CCHS questions were used to assess respondents' health and well-being: self-reported general and mental health, life satisfaction, stress, and sense of community belonging. In each case, respondents selected from four or five options. Responses to the questions about self-perceived general and mental health were dichotomized as "good" (excellent/very good/good) or "poor" (fair/poor). Stress was dichotomized as "high" (quite a bit/extreme stress) or "low" (not at all stressful/not very stressful/a bit stressful). Life satisfaction was dichotomized as "high" (very satisfied, satisfied) or "low" (neither satisfied nor dissatisfied/dissatisfied or very dissatisfied). Sense of community belonging was dichotomized as "present" (very strong/somewhat strong/weak) or "very weak" (very weak).

Respondents were asked if a health professional had diagnosed them with any of the following chronic conditions: high blood pressure, diabetes, heart disease, cancer, a bowel disorder such as Crohn's Disease or colitis, osteoporosis (respondents aged 50 or older), or any other long-term physical or mental condition. Individuals were considered to have a chronic condition if they responded "yes" to the presence of one or more.[9]

Two health behaviours—cigarette smoking and fruit/vegetable consumption—were considered. Smoking was dichotomized as current non-smoker or current smoker. Fruit/Vegetable consumption was considered "low" if respondents reported fewer than five times a day, and "adequate" if they reported five or more times a day. Weight status, including obesity, was not retained as an outcome variable because directly measured height and weight were available for only 57.5% of adult respondents.[18]

Statistical analysis

Associations between HFI and the health outcomes/behaviours were examined in a series of univariate and multivariate logistic regression models. The multivariate models were adjusted for age and gender (Model 1); for age, gender and household education (Model 2); and for age, gender, household education and household income adequacy (Model 3). Standard errors were estimated with a bootstrapping procedure.[19,20] Prevalence estimates were calculated using sampling weights provided by Statistics Canada to account for design effect and non-response bias. Sampling variability guidelines recommended by Statistics Canada for interpreting the coefficient of variation (CV) were used. Data with a moderate CV (16.5% to 33.3%) must be interpreted with caution.[15] Stata Version 9 (Stata Corp, College Station, TX, USA) was used to perform the statistical analyses.

The study was conducted under the Research Data Centre Program,[21] which provided access in a secure university setting to the 2004 CCHS—Nutrition Master File.[13] Institutional ethics approval was received from the Human Research Ethics Board of the Faculty of Agriculture, Forestry and Home Economics, University of Alberta.

Results

The sample size comprised 837 Aboriginal respondents aged 18 or older living off a reserve, 57% of whom were women (data not shown). More than half (52%) of respondents were aged 18 to 40; a third (32%) were aged 41 to 55; and the remaining 15% were aged 55 or older. More than a third (36%) lived in households where the highest level of educational attainment was secondary graduation or less. Almost half lived in households in the lowest (23%) or lower-middle (25%) income adequacy categories; 48% were from households in the upper-middle (30%) or highest (18%) income categories. For small percentages of respondents, data were missing for education (3%) and household income adequacy (5%).

Table 1
Prevalence of measures of health and well-being and health behaviours, by household food security status, off-reserve Aboriginal population aged 18 or older, Canada, 2004

	Total	Household food security status	
		Insecure	Secure
		%	
Self-perceived general health			
Good	75	64	79
Poor	25	36	21
Self-perceived mental health			
Good	87	79	90
Poor	13	21[E]	10[E]
Self-perceived stress			
Low	72	57	79
High	28	43	21[E]
Life satisfaction			
High	83	72	87
Low	17	28[E]	13[E]
Sense of community belonging			
Present	87	80	89
Very weak	13	20[E]	11[E]
Chronic condition			
No	55	53	57
Yes	45	47	44
Smoking			
Non-smoker	49	36	54
Current smoker	51	64	46
Fruit/Vegetable intake			
At least 5 times a day	14	9[E]	17
Less than 5 times a day	86	91	83

[E] use with caution
Source: 2004 Canadian Community Health Survey—Nutrition.

Almost three in ten (29%) Aboriginal adults lived in food-insecure households. Compared with their counterparts in food-secure households, they were more likely to report poor general health (36% versus 21%) and poor mental health (21% versus 10%), life dissatisfaction (28% versus 13%), a very weak sense of community belonging (20% versus 11%), high stress (43% versus 21%), and cigarette smoking (64% versus 46%) (Table 1). When age and gender were taken into account, these relationships remained significant, and in addition, Aboriginal adults in food-insecure households had greater odds of low fruit/vegetable consumption than did those in food-secure households (Table 2, Model 1). When household education was also considered (Model 2), the odds for poor mental health, smoking, and low fruit/vegetable consumption no longer differed significantly between the two groups. And when income adequacy was included (Model 3), stress was the only health outcome that remained significantly higher for Aboriginal adults in food-insecure households.

Discussion

The 2004 CCHS—Nutrition data reveal associations between HFI and several health outcomes among Aboriginal adults living off a reserve. Even when age, gender and household education were taken into account, adults in food-insecure households were more likely than those in food-secure households to have poor self-perceived general health, high stress, low life satisfaction, and a very weak sense of community belonging. However, except for stress, the relationships were no longer significant when the data were further adjusted for household income. The inclusion of income likely over-adjusted the data, because the HFSSM questions pertain either to a lack of money or an inability to afford food as the reason for the situations and behaviours that characterize food insecurity.[13,14] Therefore, the results of the age-/gender-/education-adjusted model may better reflect the associations between HFI and the health outcomes.

The poorer health and well-being of Aboriginal adults in food-insecure households are consistent with other research. For example, a study of CCHS respondents with diabetes found that HFI was associated with life dissatisfaction, poor general and mental health, and increased stress.[22]

Anxiety is another dimension of HFI.[13] In Canada, HFI has been associated with acute and chronic stress, a sense of alienation, and exclusion from society.[23,24] Thus, the associations between HFI and stress, life dissatisfaction and a very

What is already known on this subject?

- Aboriginal people experience mortality and morbidity rates that exceed rates for non-Aboriginal Canadians.
- Household food insecurity is an important public health issue in Canada, particularly for economically marginalized groups including First Nations, Métis and Inuit.
- Household food insecurity is a possible precursor to suboptimal dietary intakes and compromised health and well-being.

What does this study add?

- Aboriginal adults in food-insecure households were more likely than those in food-secure households to have poor general health, high stress, less life satisfaction, and a very weak sense of community belonging.
- These relationships persisted even when age, gender and household educational attainment were taken into account.

Table 2
Unadjusted and adjusted odds ratios relating household food security status to measures of health and well-being and lifestyle behaviours, off-reserve Aboriginal population aged 18 or older, Canada, 2004

				Model 1 (adjusted for age, gender)			Model 2 (adjusted for age, gender, household education)			Model 3 (adjusted for age, gender, household education, household income adequacy)		
	Unadjusted odds ratio	95% confidence interval		Adjusted odds ratio	95% confidence interval		Adjusted odds ratio	95% confidence interval		Adjusted odds ratio	95% confidence interval	
		from	to		from	to		from	to		from	to
Poor self-perceived general health												
Food insecure	2.09*	1.17	3.74	2.42*	1.34	4.36	2.37*	1.29	4.37	1.53	0.75	3.11
Food secure†	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Poor self-perceived mental health												
Food insecure	2.55*	1.06	6.14	2.54*	1.05	6.12	2.36	0.96	5.81	1.62	0.48	5.50
Food secure†	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
High self-perceived stress												
Food insecure	2.81*	1.45	5.43	2.77*	1.46	5.26	2.86*	1.48	5.52	3.13*	1.44	6.78
Food secure†	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Low life satisfaction												
Food insecure	2.64*	1.24	5.62	3.03*	1.43	6.43	2.89*	1.40	5.95	2.15	0.89	5.18
Food secure†	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Very weak sense of community belonging												
Food insecure	2.16*	1.05	4.45	2.10*	1.02	4.33	2.16*	1.07	4.36	1.70	0.76	3.81
Food secure†	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Presence of chronic condition												
Food insecure	1.17	0.66	2.08	1.47	0.82	2.64	1.61	0.88	2.93	1.65	0.81	3.38
Food secure†	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Current smoker												
Food insecure	2.08*	1.22	3.54	1.93*	1.12	3.31	1.59	0.94	2.69	1.20	0.66	2.17
Food secure†	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Low fruit/vegetable intake												
Food insecure	2.00	0.98	4.09	2.12*	1.04	4.36	1.99	0.97	4.08	1.86	0.76	4.55
Food secure†	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...

† reference category
* significantly different from reference category ($p<0.05$)
... not applicable
Source: 2004 Canadian Community Health Survey—Nutrition.

weak sense of community belonging in the present study were anticipated.

Among Canadians in general, a very strong sense of community belonging has been associated with excellent or very good general and mental health.[25] Among Aboriginal Canadians in particular, the connection between the individual and the larger society continues to be a strong determinant of health.[26] In this study, HFI was associated with a very weak sense of community belonging and poor self-reported health; however, it is possible that an interrelationship may exist among all three.

Limitations

Specific problems related to the design and variable selection of the CCHS 2004—Nutrition make the interpretation of results problematic. The survey was cross-sectional, so causal relationships between variables cannot be inferred. And because the survey relied on self-reports, the results are subject to recall and report bias.

Owing to the small number of Aboriginal respondents, the present study was limited by the need to aggregate data. For example, health outcomes for respondents from the most food-insecure households could not be examined separately. As well, data for individuals with sole and mixed Aboriginal ancestry had to be combined, although their life experiences and cultural orientation may differ.[27] Similarly, data for respondents who identified as North American Indian, Métis or Inuit had to be pooled. Individuals reporting North American Indian origins comprised the largest percentage of Aboriginal respondents, so the findings are more reflective of the circumstances of First Nations than of the other groups.

Cultural or ethnic identity may influence individuals' perception of their well-being.[28] The concept of health for

many Aboriginal peoples is a balance of the physical, mental, emotional, spiritual and social aspects of life.[29] Questions that would assess the degree to which such a balance is achieved were not part of the CCHS. Consequently, the measures of health may not correspond with traditional Aboriginal perceptions of health that are based on holistic and ecological foundations.[30]

The small sample size precluded analysis of health outcomes of HFI among Aboriginal children. This is an important area of research for future studies.

Conclusion

The complex reality of the lives of the Aboriginal population living off a reserve is of major importance, but these groups tend to be under-represented in health research in Canada.[31] Using an internationally validated tool, the present study contributes to a greater understanding of HFI among this population. The findings suggest that the pervasiveness of HFI in the context of financial constraint may contribute to the relatively poor health and well-being of Aboriginal people. ■

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